



The United States Department of Agriculture's (USDA) Homeland Security Office established the NAHLN as part of a national strategy to coordinate and network the diagnostic testing capacities of the Federal veterinary diagnostic laboratories with the extensive infrastructure (facilities, professional expertise, and support) of State and university veterinary diagnostic laboratories. This network enhances the Nation's early detection of, response to, and recovery from animal health emergencies, including bioterrorist events, newly emerging diseases, and foreign animal disease (FAD) agents that threaten the Nation's food supply and public health.

Laboratory Membership

In 2002, the Animal and Plant Health Inspection Service (APHIS) and Cooperative State Research Education and Extension Service initiated the network by entering into cooperative agreements with 12 State and university veterinary diagnostic laboratories. These were funded by Homeland Security appropriations. APHIS has since contracted with additional State and university diagnostic laboratories to assist with testing and surveillance. These contracts are with 54 State/university laboratories; the Department of the Interior (DOI) laboratory in Madison, Wisconsin; the Food Safety and Inspection Services laboratory in Athens, Georgia; and the National Veterinary Services Laboratories (NVSL), Ames, IA and Plum Island, NY campuses, for a total of 58 laboratories in 45 States.

NVSL trains and proficiency tests the NAHLN member laboratories either annually or semi-annually. Tests include standardized screening methods for the currently targeted diseases in the NAHLN [avian influenza (AI), exotic Newcastle disease (END), foot and mouth disease (FMD), classical swine fever (CSF), bovine spongiform encephalopathy (BSE), chronic wasting disease (CWD), and scrapie]. NAHLN laboratories perform screening assays and forward any suspect or positive samples to the appropriate section of the NVSL (the national reference laboratory) for confirmatory testing.

Current Activities

- **Scenarios Testing:** The week of February 11, 2008, the NAHLN AI tabletop exercise was beta tested in IA and OH. The game moves the participants through challenges encountered during an outbreak of highly pathogenic avian influenza. Participants gain enhanced awareness of laboratory issues they will encounter during an outbreak and have the opportunity to assess the completeness of their response plans. The tabletop will be provided to NAHLN laboratory personnel and other animal health professionals in facilitated sessions throughout the United States during 2008.
- **NAHLN Review:** The NAHLN program was reviewed by stakeholders in 2007. The review report indicated that the mission, vision and founding principles are still valid and appropriate recommendations for further action were made. The NAHLN Steering Committee developed a series of questions to gather the data needed to address the recommendations. Surveys were sent, in March 2008, to various stakeholder groups (Laboratory Directors, State Veterinarians, industry groups and VS personnel). Data collected will be analyzed and a meeting held with stakeholder groups to discuss how to proceed. Regular updates on progress will be provided to stakeholders.
- **Modeling to Determine Diagnostic Capacity:** One of the NAHLN efforts for the past several years has been to determine the amount of laboratory space needed to address the testing volume during and after an animal disease outbreak. We are now using modeling to help determine if adequate biosafety level-2 (BSL-2) and BSL-3 space is available to deal with the number of samples that would be generated in an outbreak and during recovery.



- **High-Throughput Equipment Training:** Kansas State University will host training workshops in collaboration with NVSL, Diagnostic Virology Laboratory and Foreign Animal Disease Diagnostic Laboratory for High-Throughput equipment. Sessions will be held the weeks of May 19, June 23, and July 22, 2008. Representatives from 31 NAHLN laboratories will participate in a two-day training course that will include an overview of High-Throughput systems, instruction on equipment programming and breakout sessions that will give hands-on use of each piece of equipment. The systems have been validated for use with real time PCRs for AI, CSF, and FMD. Upon completion of training, participants will be proficiency tested (PT).

Ongoing Initiatives

- **“Train the Trainer” Program:** APHIS developed and implemented a “Train the Trainer” program for FMD, CSF, AI, and END rapid assays. This increased the number of State/university laboratories approved to conduct the CSF and FMD assays from 14 to 36. The program was recently implemented for AI and increased the number of State/university and DOI laboratories approved to conduct AI testing from 44 to 53 laboratories. The program will be implemented upon the completion of the High-Throughput Equipment Training when participants who successfully complete PT will be able to train other personnel from their laboratories. Not only has the program increased the number of laboratory personnel prepared to respond to a national animal health emergency, but it provides a cadre of trainers available to teach others. Successful implementation of this program is a significant step for the Network and its mission of ensuring sufficient diagnostic capability and capacity to address an animal health emergency.
- **Surveillance Activities:**
 - **CSF Surveillance -** In January 2006, USDA developed and implemented phase one of a surveillance plan for CSF in states (and Puerto Rico) with a high risk for introduction of CSF. Twelve (12) State/university NAHLN laboratories test samples and 18 other State/university NAHLN laboratories assist with sample collection and processing. The number of State/university NAHLN laboratories participating in surveillance testing has increased to 36 in 2007. NVSL’s Foreign Animal Disease Diagnostic Laboratory at Plum Island, NY, performs confirmatory testing.
 - **TSE Surveillance Testing -** Since June 2004, seven State/university NAHLN laboratories have participated in enhanced BSE surveillance testing. As of December 1, 2006, they completed in excess of 797,000 tests. NVSL’s Pathobiology Laboratory in Ames, IA, performs confirmatory testing. Surveillance for CWD and scrapie also occurs in 26 State/university NAHLN labs.
 - **Wildbird Surveillance -** Fifty-two (52) approved State/university laboratories and one (1) DOI NAHLN laboratory conduct enhanced AI surveillance efforts for APHIS’s Veterinary Services (VS) and Wildlife Services (WS). These laboratories determine if evidence of the AI virus is present and whether it is an H5 or H7 subtype. Because of the potential for H5 or H7 subtypes to mutate into highly pathogenic strains, they forward presumptive positive samples to NVSL for confirmatory testing. NVSL then conducts additional screening tests and confirmatory tests with research assistance from USDA’s Southeast Poultry Research Laboratory as needed to confirm genetic identification of isolated strains of the virus. The NVSL Diagnostic Virology Laboratory in Ames is the only internationally recognized AI reference laboratory in the United States.
 - **Vesicular Stomatitis Disease Surveillance:** Personnel from six NAHLN laboratories have been trained and proficiency tested. The complement fixation test for vesicular stomatitis can be conducted on equidea in approved laboratories after the index case has been confirmed by NVSL.



- **Diagnostic Capacity:** NAHLN and AI supplemental funds were used to increase the overall diagnostic testing capability of member laboratories by supporting the development and distribution of High-Throughput equipment. This technology allows semi-automated processing of diagnostic samples and test methods to enhance the daily testing output of each laboratory. In order to determine the most appropriate placement of the High-Throughput equipment within NAHLN laboratories, NAHLN requested the assistance of analytical epidemiologists within the USDA, APHIS, VS, Centers for Epidemiology and Animal Health, Center for Animal Disease Information and Analysis, Risk Analysis Team. This team was able to prepare a risk assessment model to evaluate the risk level of high pathogenicity avian influenza introduction and spread, and they created a prioritized ranking of states based on risk level. NAHLN purchased High-Throughput equipment that was distributed in 2007 to 31 NAHLN laboratories located in highest risk states. Training on the High-Throughput Equipment scheduled summer of 2008 will ensure that there is adequate capacity to respond to diagnostic testing needs during an outbreak. Currently, APHIS is validating NAHLN methods for AI, CSF, and FMD using this type of technology.
- **USDA/DHS Diagnostic Roadmap:** USDA and Department of Homeland Security (DHS) are continuing to update and implement a Diagnostic Roadmap to evaluate and prioritize gaps in available diagnostic technology for U.S. Agriculture and propose mechanisms to address and ultimately close them. A high-level strategic roadmap, applicable across a range of FAD threats, was developed in addition to roadmaps specific for several high-consequence FADs.
- **International Collaboration:**
 - APHIS collaborates with the Canadian Food Inspection Agency laboratory at the Winnipeg National Centre for Foreign Animal Disease to produce, distribute, and use proficiency panels and reference materials to harmonize the diagnosis of major animal diseases between U.S. and Canada.
 - APHIS is working with animal health laboratory network personnel from Canada and Mexico to develop the terms of cooperation and a road map towards the harmonization of tests used in North America for the diagnosis of animal diseases. This initiative addresses a key objective of the Security and Prosperity Partnership of North America towards creating a safer and more reliable food supply, while facilitating agricultural trade, by pursuing common approaches to enhanced food safety, enhanced laboratory coordination, and information sharing.
 - APHIS developed and provided international training programs for AI epidemiology and diagnostics to laboratory personnel from 60 countries. APHIS developed and implemented similar training programs in seven countries for FMD and brucellosis.
- **NAHLN IT System:** A critical aspect of the NAHLN is the effort to standardize data, improve data quality, and maximize the efficiency of data transfer via the information technology (IT) infrastructure and data repository. The NAHLN IT system is being integrated with numerous existing animal health and veterinary diagnostic data networks to allow seamless electronic transfer of information from the time diagnostic samples are collected in the field, to the addition of appropriate diagnostic test information from the NAHLN laboratories, and finally to the daily reporting of relevant information from each submission to the NAHLN repository database. The IT system enhances surveillance programs, recognizes emerging issues, and provides automated alerts on defined animal health events to authorized personnel who support disease prevention and response. The NAHLN IT system has been piloted in five laboratories and is currently expanding to 30 additional laboratories.

The NAHLN Information Technology System (NAHLN ITS) allows for electronic messaging of test results for diagnostic samples tested by NAHLN laboratories. Defined electronic message are



being developed for CSF [real-time, reverse transcription polymerase chain reaction (rRT-PCR)], BSE [enzyme linked immunosorbent assay (ELISA)], and AI (rRT-PCR). Training on messaging has been provided for most laboratories and documentation on the process for messaging is available in the User Documentation Guide. Electronic messaging through the NAHLN is a critical component of the NAHLN process as it allows for timely and accurate reporting of the diagnostic testing which has been completed. It is also designed to simplify the reporting process and eliminate the need for duplicate data entry into the web-based applications supported by the Animal Health and Surveillance Management (AHSM). Once messaged, the results are immediately applied to the appropriate samples awaiting test results both within the NAHLN as well as within the AHSM.

- **NAHLN Working Groups:**

- **Aquaculture** – the group was established in June 2007 at the request of the NAHLN Steering Committee. A call went out to all AAVLD laboratory directors as well as others involved in aquaculture. All volunteers were included in the working group. The initial focus of the working group was specifically to determine capacity for testing VHS. The long-term goal, is the formulation of a network of laboratories that are involved in testing for aquaculture pathogens and could also be involved in proficiency testing, test validation and in an emergency to cover surge testing if outbreak situations arose. A survey was developed by the group and provided to 81 laboratories (private and public). 26 labs did not respond. Of those that did, 36 are interested in participating in aquaculture testing. The group met at AAVLD/USAHA in October 2007 to discuss the results of the survey.
 - **Exercises and Drills** - The group was established in September 2007 and is made up of representation from large and small laboratories as well as Core Member, Member, and Contract laboratories. This group assisted in developing laboratory based questions used in the AI Tabletop exercise and will also assist in developing and implementing drills for NAHLN laboratories.
 - **Methods Technical** - This group, established in July 2006, consists of personnel from NAHLN laboratories and NVSL as well as Department of Interior, USDA Food Safety Inspection Service, and the National Center for Foreign Animal Disease in Winnipeg, Manitoba. The working group provides input on various aspects of methods validation and approval of methods including: review of available methods and associated gaps; identification of potential new technologies; validation criteria; dossier review; assay approval process; equivalency of modified methods or for adaptation to new platforms; continual performance assessment of assays; development of performance characteristic summary documents for NAHLN assays; issues associated with transfer of existing and new technologies to laboratories.
 - **Toxicology** - The NAHLN Toxicology Working Group was formed in April 2007 during the melamine/pet food issue. The working group wrote a white paper to request Federal funding to fully equip a series of AAVLD-accredited veterinary analytical toxicology laboratories with state-of-the-art analytical instrumentation, the highly trained personnel required to run and maintain those instruments, and to provide recurring funds for those personnel, procurement of analytical reagents and standards, proficiency testing, methods/instrument development and validation, training, IT, emergency response, exchange of information, and for training the next generation of toxicologists. The group will meet in 2008 to discuss the potential use protocols developed for the Food Emergency Response Network.
- **Integrated Consortium of Laboratory Networks (ICLN):** NAHLN is a participating member of the ICLN, which is a multi-department and multi-agency effort led by DHS. The ICLN includes public, animal, and plant health response networks [Laboratory Response Network,



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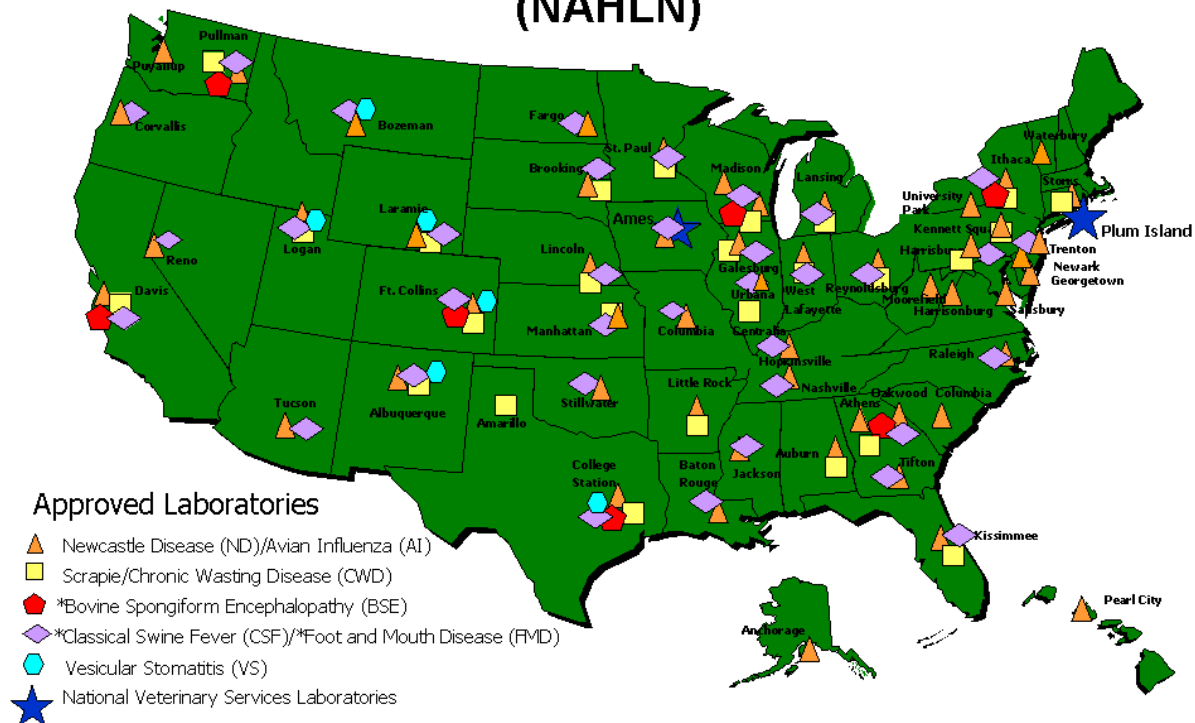
Environmental Laboratory Response Network, Food Emergency Response Network, National Plant Diagnostic Network, and NAHLN). This group identifies gaps in surveillance and diagnostic efforts of national importance and develops mechanisms for collaboration and sharing of information and resources.

- **NAHLN Symposia:**

- **2008 AAVLD/USAHA** – Emergency Response - NAHLN is organizing an Emergency Response symposium that will be held in conjunction with the 2008 AAVLD and USAHA meeting. Topics to be discussed include: developing and implementing disease response plans, VS and State; roles and responsibilities during an outbreak; modeling to determine laboratory capacity; VS Memo 580.4; using bar-coding and IT to increase efficiency; NAHLN AI and other exercises; National Veterinary Stockpile, development and outreach; FMD vaccine bank; use of mobile laboratories; and integrated response.
- **2009 WAVLD** – Establishment of Veterinary Diagnostic Networks – VS NAHLN will lead efforts to organize a pre-meeting symposium for the June 2009 WAVLD meeting on the establishment and implementation of veterinary laboratory networks.

- **NAHLN Website:** The website provides information on the organization, mission, and vision of the NAHLN along with current lists and maps of approved NAHLN laboratories. Information on the NAHLN IT system, surveillance efforts, and other NAHLN related publications can also be found at http://www.aphis.usda.gov/animal_health/nahln/.

National Animal Health Laboratory Network (NAHLN)



*For specified agents, not all laboratories are currently participating in surveillance testing.

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| NAHLN Approved Laboratories by Disease and State | | | | | | |
|--------------------------------------------------|----------------|-----------------|------------------------------|--------------------------|-----------------|-----------------|
| State | AI Approved | END Approved | CWD / Scrapie Approved | CSF / FMD Approved | BSE Approved | VSV Approved |
| AK | 1 | 1 | | | | |
| AL | 1 | 1 | 1 | | | |
| AR | 1 | 1 | 1 | | | |
| AZ | 1 | 1 | | 1 | | |
| CA | 1 | 1 | 1 | 1 | 1 | |
| CO | 1 | 1 | 1 | 1 | 1 | 1 |
| CT | 1 | 1 | 1 | | | |
| DE | 2 | 2 | | | | |
| FL | 1 | 1 | 1 | 1 | | |
| GA | 3 | 3 | 1 | 2 | 1 | |
| HI | 1 | | | | | |
| IA | 1 | 1 | | 1 | | |
| IL | 2 | 2 | 2 | 2 | | |
| IN | 1 | 1 | 1 | 1 | | |
| KS | 1 | 1 | 1 | 1 | | |
| KY | 1 | 1 | | 1 | | |
| LA | 1 | 1 | | 1 | | |
| MD | 1 | 1 | | | | |
| MI | 1 | 1 | 1 | 1 | | |
| MN | 1 | 1 | 1 | 1 | | |
| MO | 1 | 1 | | | | |
| MS | 1 | 1 | | 1 | | |
| MT | 1 | 1 | | 1 | | 1 |
| NC | 1 | 1 | | 1 | | |
| ND | 1 | 1 | | 1 | | |
| NE | 1 | 1 | 1 | 1 | | |
| NJ | 1 | 1 | | 1 | | |
| NM | 1 | 1 | 1 | 1 | | 1 |
| NV | 1 | 1 | | | | |
| NY | 1 | 1 | 1 | 1 | 1 | |
| OH | 1 | 1 | 1 | 1 | | |
| OK | 1 | 1 | | 1 | | |
| OR | 1 | 1 | | 1 | | |
| PA | 3 | 3 | 2 | 1 | | |
| SC | 1 | 1 | | | | |
| SD | 1 | 1 | 1 | 1 | | |
| TN | 1 | 1 | | 1 | | |
| TX | 1 | 1 | 2 | 1 | 1 | 1 |
| UT | 1 | 1 | 1 | 1 | | 1 |
| VA | 1 | 1 | | | | |
| VT | 1 | | | | | |
| WA | 2 | 2 | 1 | 1 | 1 | |
| WI | 2 | 2 | 1 | 1 | 1 | |
| WV | 1 | 1 | | | | |
| WY | 1 | 1 | 1 | 1 | | 1 |
| NVSL - Ames, IA | 1 | 1 | 1 | 1 | 1 | 1 |
| NVSL - Plum Island, NY | | | | 1 | | |
| # of Labs TOTAL | 54 | 52 | 27 | 38 | 8 | 7 |
| # of States TOTAL | 45 | 44 | 24 | 34 | 8 | 6 |